

NEW GENERA AND SPECIES OF MELANOPLI FOUND
WITHIN THE UNITED STATES (ORTHOPTERA;
ACRIDIDAE)

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In the past few years the Melanopli from North America, north of the Mexican boundary, in the Philadelphia collections have been assembled, sorted to species and given a preliminary examination by the author. In addition, a large part of the historic material bearing on this group, in other American collections, has very kindly been loaned to us for comparison and study. The time for compilation of the manuscript of this study has arrived, the thousands of specimens being fully arranged and their relationships plotted, but active military service obliges the postponement of this work for an indefinite period. It appears advisable, however, to describe the new species, except those of the genus *Melanoplus*, which do not need further study to determine racial values, which species will later be more elaborately treated in the contemplated study.

The sequence of the species here described is according to the revised arrangement of the species from the preliminary studies already completed.¹ The final study of the group will probably show some changes in this order, but we do not believe these will be at all drastic. It is clear that Scudder incorrectly grouped many forms.

Particular efforts have been made in all the field work by Rehn and Hebard to secure as large and representative series of the group as possible. This has shown that, though we are now in a far better position to treat the species with scientific accuracy, it is highly probable that intensive local field work, particularly at high elevations in the mountains of the West, will reveal additional undescribed forms.

In the present paper two new genera, ten new species and one new geographic race are described. The series of these new

¹ The same system of linear arrangement is followed in the author's "Notes on Mexican Melanopli," Proc. Acad. Nat. Sci. Phila., 1917, pp. 251 to 275, (1917).

forms examined contains five hundred and sixty-six specimens, of which all but thirteen are in the Philadelphia collections.

Gymnoscirtetes morsei² new species (Plate VIII, figs. 4, 5 and 6.)

This species shows close relationship to *G. pusillus* Scudder (Plate VIII, figs. 1, 2 and 3), agreeing in form, coloration and color pattern. The genitalia of both sexes afford, however, striking and constant characters for specific distinction.

Type.—♂; De Funiak Springs, Walton County, Florida. August 30, 1915. (Rehn and Hebard.) [Hebard Collection, Type No. 215.]

Size larger than, form similar to, that of *pusillus*. Head with interocular space about as wide as first antennal joint³ (wider than normal in *pusillus*). Prosternal spine rather elongate, beyond base rather slender, cylindrical, scarcely tapering to the bluntly rounded apex (in this sex of *pusillus*, though individually slightly variable, this spine averages shorter and tapers distinctly to the less bluntly rounded apex). Supra-anal plate elongate shield-shaped, with surface longitudinally trisulcate, the lateral margins moderately reflexed and with two small, elongate, longitudinal convexities proximo-laterad of the small projecting apex (in *pusillus* much shorter, triangular, with lateral margins very feebly convex and apex blunt; contour similar but much less decided). Furcula as in *pusillus*. Cerci specialized, distinctive (see Plate VIII, fig. 5). Subgenital plate strongly elevated in a large, medio-dorsal projection, which is fully twice as long as broad, with apex blunt, directed dorso-cephalad (this is a similar but very much more decided development of the type found in *pusillus*).

Allotype.—♀; same data as type. [Hebard Collection.]

Size larger than male, larger than in *pusillus*. Agrees with male in ambisexual characters, except that the interocular space averages broader, the prosternal spine is heavier and shorter (this spine in females of *pusillus* shows the same relative difference, but not as conspicuously, as in the male sex of these species, in all exhibiting slight individual variation). Ovipositor valves elongate; the dorsal pair with disto-dorsal declivity brief to the blunted apical tooth (in *pusillus* the disto-dorsal declivity is much more elongate, with apical tooth acute); the ventral pair with disto-lateral and apical tooth blunted, the portion beyond the disto-lateral tooth very brief (in *pusillus* with these teeth acute, the portion beyond the disto-lateral tooth elongate).

² In honor of Dr. Albert P. Morse, of Wellesley, Massachusetts, whose splendid studies in North American Orthoptera may be said to include among the first publications dealing with the subject in a thoroughly scientific manner.

³ In the series at hand, however, this dimension shows some variation; it may be said to average wider in *morsei* than in *pusillus*.

	Measurements (in millimeters)				
	Length of body	Length of antenna	Length of pronotum	Width of pronotum	Length of caudal femur
♂					
Type.	15.3	6.1	2.5	2.2	7.9
Paratypes (16).	14.2-16.2	5.3-6.2	2.3-2.6	2.1-2.3	6.8-7.4
♀					
Allotype.	20.7	7.2	3.1	2.8	9.4
Paratypes (11).	19.5-21.5	6.7-6.5	3-3.1	2.7-2.8	9.7-9.4

General coloration of dorsum ochraceous-tawny to clay color. Eyes chestnut brown, with a broad postocular band of shining blackish chestnut-brown extending caudad to distal third of abdomen. All portions below these bands and distal portion of male abdomen paler than dorsum, yellowish, sometimes with a greenish tinge. Caudal femora clay color, in occasional females strongly tinged with absinthe green. Caudal tibiae kildare green to absinthe green, spines white with distal half black. (In all features much as in *pusillus*.)

In addition to the type and allotype, a series of sixteen males and eleven females, all bearing the same data, are considered paratypes. This series was taken in a boggy area of wire-grass and bog plants, which was not over fifteen yards wide by forty yards long. No sign of the species was found elsewhere, even in areas of similar vegetation.

Phaulotettix eurycerus new species (Plate VIII, figs. 7 and 8.)

This insect is related to *P. compressus* Scudder. The major features of difference are the smaller size, distinctive cerei, pallium and subgenital plate of the male and the much smaller size and somewhat less robust form of the female. Unlike that species,⁴ strongly contrasting green and brown color phases do not appear to be developed in *eurycerus*. In the fifty-nine specimens before us all are brown, one female and a few males being tinged with greenish yellow; none show different types of caudal tibial coloration, the caudal tibiae being pink, individually varying in intensity.

While the distribution of *compressus* is known to extend in Mexico over the greater portion of Coahuila and over Tamaulipas to northern Vera Cruz, the material at hand shows its distribution in the United States to be coincident with, but much more

⁴ See Hebard, Proc. Acad. Nat. Sci. Phila., 1917, p. 262, for synonymy and discussion of the striking color variations in *compressus*. It should be noted that the first description of adults of that species is by Rehn, for his synonymous *Sinaloa brevispinis*, Proc. Acad. Nat. Sci. Phila., 1904, p. 535.

restricted than, that of *eurycercus*. The material before us of *compressus* is from Beeville, Cotulla, Sabinal, Uvalde and Del Rio, Texas.

Type.—♂; Laguna del Gato, three miles west of Sam Fordyce, Hidalgo County, Texas. Elevation 175 to 200 feet. August 6, 1912. (Rehn and Hebard.) [Hebard Collection, Type No. 218.]

Size smaller than *compressus*, form appreciably less robust, this the more pronounced in head, pronotum and caudal femora. Head and pronotum agreeing in contour with that species, the caudal margin of the pronotum similarly (normally) very feebly concave. Tegmina elliptical, (normally) smaller than in *compressus*, extending almost to caudal margin of metanotum (in series occasionally extending slightly beyond metanotum, as is normal for *compressus*). Prosternal spine blunt conical. Supra-anal plate and minute, linear, parallel furcula much as in *compressus*. Cerci distinctive, broad, tapering moderately in proximal two-thirds, distal third three-fifths as broad as base with margins parallel to transversely truncate apex, the dorsal angle of which is more broadly rounded than the ventral angle (compare Plate VIII, fig. 8 with fig. 9 of *compressus*). Pallium broad (twice as broad as in *compressus*), projecting dorsad, twice as broad as high, the convex dorsal surface forming nearly a semicircle with marginal convexity caudad. Subgenital plate rectangulato-convex, truncate (sub-conical convex in *compressus*).

Allotype.—♀; same data as type. [Hebard Collection.]

Agrees with type in ambisexual characters, except the following. Size decidedly larger, form decidedly more robust; but not showing anything like the very great disparity between the sexes in these features found in *compressus*. Median carina of pronotum more distinct and percurrent, the pronotum (as in *compressus*) more inflated. Ovipositor valves as in *compressus*.

*Measurements (in millimeters)*⁵

♂	Length of body	Length of pronotum	Width of pronotum	Exposed length of tegmen	Length of caudal femur
<i>Type</i> .	17	3.7	3.3	2.2	9.6
<i>Paratypes</i> .	16-17.7	3.7-3.8	3.1-3.4	2.2-2.8	9-9.8
Quitman Mountains, Texas.	13.2	3.2	2.8	2.2	8.2
Del Rio, Texas.	18	4.1	3.8	2.7	10.3
♀					
<i>Allotype</i> .	23	5.2	5	3.2	12.7
<i>Paratypes</i> .	21-24.5	4.6-5.6	4.5-5.4	3.1-2.9	11.7-12.7
Marathon, Texas.	27	5.8	5.7	3.4	13.4

⁵ In the present paper the measurements are given for the largest and smallest examples of both sexes in the series, where these are not represented in the extremes given for the typical series.

Coloration.—Males. General coloration rather light brown, with a broad postocular band of dark brown on each side extending to the principal sulcus (or in other series to the caudal margin) of the pronotum, this often margined dorsad by a narrow band, which is paler than the general coloration. Abdomen with proximal dorsal segments maculate laterad with dark brown to varying degrees. Caudal femora very light brown, heavily twice banded with blackish brown and with genicular areas often as dark. Caudal tibiae pink.

Five males have the paler portions showing a greenish tinge, this most conspicuous on the limbs; in three of these the paler portions are pale yellowish-green.

The females are usually paler, the general brown coloration more reddish. In all, the postocular band is subobsolete and in only the two or three darkest examples are the dark abdominal markings present. The two dark bands of the caudal femora are distinct, but as pronounced as in the male sex in but four specimens. The caudal tibiae are similar to those of the males, though in the paler examples the pink is more dilute.

Specimens Examined: 65; 32 males, 16 females, 9 immature males and 8 immature females.

TEXAS: Kerrville, Mission, Laguna del Gato, Uvalde, Del Rio, Sanderson, Marathon, Kent, Neville Spring in Brewster County, Cañon behind Pulliam Bluff in Chisos Mountains and Quitman Mountains.

The adults, with one exception, were taken from August 5 to September 13, 1912 by Rehn and Hebard.

One male from Mission and a series of nine males and ten females from Laguna del Gato, bearing the same data as the type, may be considered paratypes.

The type series was found occasional on small rounded hills covered with loose gravel and bearing scattered bunches of low bushy plants, in company with a slightly less abundant species of *Rhabdotettix*. The *Melanopli* were generally distributed through the clumps of plants, the present species found more numerous in a low green rhamnaceous shrub (probably *Condalia obovata*), in which *Dichopetala castanea* Rehn and Hebard was locally abundant. The species was found to be everywhere thamnophilous, and was taken up to an elevation of 5000 feet in the Quitman Mountains of extreme western Texas. It was twice found on a sensitive-leaved acacia, *Acacia berlandieri*, and twice singly on sotol, *Dasylirion* species.

CHLOROPLUS⁶ new genus

This striking monotypic genus is nearest *Campylacantha*, differing in the proportionately much larger head, larger eyes, shorter antennae, more inflated prozona, more delicate wing venation, less inflated cephalic and median femora, proportionately shorter and more robust caudal femora and longer caudal tarsi. The more inflated prozona, less decided pronotal sulci and more delicate venation of the tegmina give the insect a smoother general facies than any species of *Campylacantha*.

Only in the genus *Phoctaliotes* of the North American forms of the Melanopli is the head found to be similarly of disproportionately large size to that of the body. That genus, however, is clearly in no way closely related to *Chloroplus*.

Genotype.—*Chloroplus cactocaetes* new species.

Generic Characters. Head very large, longer than pronotum. Eyes large, longer than genae. Antennae short and delicate, only slightly longer than the depth of the head. Caudal margin of pronotum angulate-produced. Distal portion of male abdomen not enlarged, genitalia simple. Lateral margins of male subgenital plate straight. Prosternal spine conical. Caudal femora short and robust. Caudal tarsi nearly half as long as caudal tibiae.

Chloroplus cactocaetes⁷ new species (Plate VIII, fig. 10.)

This insect is one of the most delicately colored and beautiful of the North American Melanopli. It is apparently widely separated from any other known form.

Type.—♂; Corpus Christi, Nueces County, Texas. July 29, 1912. (Hebard.) [Hebard Collection, Type No. 475.]

Size medium, form medium, slightly less slender than in *Campylacantha lamprotata* Rehn and Hebard. Head large, exceptionally large when compared with body bulk, length appreciably greater than that of pronotum. Vertex much as in *Campylacantha*, slightly produced and bluntly rounded, fastigium slightly broader and more concave than in *C. lamprotata*, frontal costa distinctly wider, widest with lateral margins decided between antennae, surface slightly depressed only at the median ocellus. Eyes very large and prominent, much longer than cheeks. Antennae slender and hardly longer than combined length of head and pronotum. Pronotum with dorsum and dorso-lateral portion of prozona somewhat inflated, smooth, with sulci weak;

⁶ From *χλωρός* = pale green, and *ὄπλον* = armor.

⁷ From *κάκτος* = cactus, and *οἰκητής* = inhabitant of.

medio-longitudinal earina weak, particularly in caudal portion of prozona; metazona finely impresso-punctate; caudal margin produced, forming an angle of slightly over 90° with apex rounded. Tegmina reaching to near base of supra-anal plate, venation very delicate. Wings reduced, reaching tegminal apices, incapable of sustained flight. Distal portion of abdomen evenly tapering, showing no enlargement. Fureula represented by two brief convexities, each projecting a distance of half its basal width. Supra-anal plate no longer than basal width, triangular with apex rounded, with a slender transverse carina mesad except at medio-longitudinal sulcus, which is deep in proximal half but obsolete distad. Cercus short, simple, broad at base, tapering to acute apex, length hardly one and one-half times basal width. Subgenital plate conical, produced to the dorso-distal blunt apex. Prosternal spine elongate, acute-conical. Interspace between mesosternal lobes over three times as long as wide. Cephalic and median femora moderately inflated. Caudal femora short, very robust, much more so than in any species of *Campylacantha*. Caudal tibiae with (10-11) spines. Caudal tarsus nearly half as long as caudal tibia.

Allotype.—♀; same data as type. [Hebard Collection.]

Agrees closely with male in coloration and relative proportions, except in the following characters. Size larger, form stouter and head even larger proportionately than in male. Vertex proportionately broader. Tegmina and wings extending to near apex of supra-anal plate. Genitalia normal, the ovipositor valves short with apices acute and rather strongly curved. Prosternal spine stouter than in male. Interspace between mesosternal lobes nearly twice as long as broad.

Measurements (in millimeters)

	♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Width of caudal femur
<i>Type</i> .		21.7	4.8	11	11.8	3.3
<i>Paratypes</i> (7).		18.5-21.8	4.2-5.2	10.2-12	10.6-12.3	3.2-3.8
Double Windmill, Brewster County, Texas.		16.4	3.9	9.2	9.8	2.9
	♀					
<i>Allotype</i> .		25	5.7	15	12.8	4
<i>Paratypes</i> (9).		23-26.2	5.7-6.2	13.3-14.4	13.5-14.3	4.2-4.4
Cotulla, Texas.		28	6.4	14.3	14.8	4.4

The size variation is shown by the series at hand to have no geographic significance whatever.

Coloration.—Little variation in general appearance is shown by the series, though considerable differences in shade are apparent on close examination. The material from Corpus Christi averages slightly darker than the other specimens. Those from San Antonio and Cotulla show the richest coloration.

Eyes buckthorn brown to chestnut brown. Antennae cinnamon-rufous, becoming paler and more yellowish proximad. Face light brownish olive,

individually varying through mignonette green through chamois with a greenish tinge to tawny olive, becoming deeper dorsad and there shading evenly into the occipital color, which is jade green individually varying to buffy olive, always bordered on each side by a narrow suffusion of chamois. Genae same color as face, a postocular band of jade green between this area and the pale lateral margins of the occipital area. Occipital coloration extending caudad on dorsum of pronotum as a very broad band of equal width to principal sulcus, thence expanded to include the entire metazona which, however, in some specimens becomes paler ventro-laterad. Medio-dorsal very broad band of prozona broadly bordered on each side with chamois. Lateral lobes of pronotum with postocular band decidedly broadened, widest in caudal portion of prozona, jade green with sometimes a median fleck of chamois, individually varying to solid ivy green; below this the lateral lobes are chamois, often with ventral portion broadly suffused with the general coloration of the face (light brownish olive or mignonette green) or of the metazona (buffy olive). Tegmina immaculate, individually kildare green to cress green. Exposed remaining lateral portions of thorax green, with ventral portion of meta-epimerum and all but narrow proximal portion of meta-episternum strikingly chamois. Ventral portions and abdomen olivaceous or yellowish, the abdomen always tinged with olivaceous distad. Cephalic and median limbs ochraceous-buff, washed, often heavily, with mikado brown. Caudal femora mikado brown, often with external face narrowly paler along the ventral margin and in proximal and distal portions, dorsal face individually clay color or cinnamon, always showing two delicate, but distinct (though individually variable in extent and intensity) and broad, transverse bands of olive. Caudal tibiae lumiere blue (a rich blue, showing slightly more green than glaucous); spines pale lumiere blue or white, with black tips.

Specimens Examined: 35; 17 males, 17 females and 1 immature female.

TEXAS: San Antonio, Cotulla, Robstown, Corpus Christi, Lake Lomalta in Cameron County, and in the Big Bend region, Double Windmill, camp two miles north of Bone Spring and Neville Spring.

One male from Robstown and a series of seven males and nine females from Corpus Christi, bearing the same data as the type, may be considered paratypes. The entire series was taken by Rehn and Hebard between July 29 and August 9, 1912.

This remarkable insect, though showing a fairly wide distribution, was found other than singly but once. It is very local, being almost entirely confined to joint-cactus, *Opuntia* species, of the *Cylindropuntia* group, in which heavily armed plant it lives. It was almost impossible to drive a specimen into the open unless the cactus was trampled down with heavy boots. In these plants the insects were found to be extremely alert and quick to dodge into the more sheltered recesses. When driven into the open they displayed unusual leaping powers, and the males were

seen to increase the distance covered by their great leaps by the use of their reduced wings. Individuals made every effort to reach another joint-cactus when driven out and whenever this was accomplished they hid almost instantly. At Corpus Christi the species was found very locally, but in moderate numbers, in the cactus and surrounding low halophytic vegetation of the extensive sandy flats bordering the bay. At all other localities rare individuals were located always in clumps of joint-cactus in dry sandy areas.

Paraidemona latifurecula new species (Plate VIII, fig. 11.)

This insect, which in size averages smallest of the species of the present genus, is readily distinguished in the male sex by the very distinctive type of furecula. Females can be separated from those of *P. fratercula*, here described, only by the prosternal spine which is blunter in *latifurecula*. Both of these species average decidedly smaller than *P. mimica* Scudder, but in the Brownsville region of Texas a decided reduction in size is found to occur frequently in that insect.

In linear arrangement this species should be placed first in the genus, followed by *fratercula*.

Type.—♂; Brownsville, Cameron County, Texas. July 31 to August 5, 1912. (Hebard.) [Hebard Collection, Type No. 476.]

In all respects the type agrees with a paratype male of *mimica*,⁸ except in the following features. Size very small (averaging smallest of genus); form moderately robust. Furecula a broad, transverse, briefly projecting plate, about three times as wide as long, with brief lateral margins straight and weakly convergent to the sharply but briefly produced, acute latero-caudal angles, caudal margin straight, transverse, between these. Supra-anal plate with lateral margins moderately convergent in proximal third, its surface showing a transverse ridge at this point; in distal two-thirds triangular, this portion about as long as its basal width, the lateral margins moderately concave and more strongly convergent to the strongly acute-angulate rounded apex, surface of this portion showing a rather sharp medio-longitudinal sulcation. The supra-anal plate is decidedly more narrowly triangularly produced than in any other species of the genus. Cerei simple, slenderly acute conical, hardly two-thirds as long as supra-anal plate. Pallium very large and convexly protuberant, as in *mimica*. Subgenital plate very small, fitting into the deep and regular concavity of all but the proximal portion of the caudal margin of the preceding segment; free dorsal margin of subgenital plate rather

⁸ We would note that in all the species of *Paraidemona* the caudal margin of the pronotum is weakly concave, and both tegmina and wings are absent.

strongly obtuse-angulate with apex rounded. Prosternal spine conical with apex decidedly blunt, heavier with apex more blunted than in *mimica*. Interspace between mesosternal lobes hardly twice as long as broad.

Allotype.—♀; same data as type. [Hebard Collection.]

Agrees with male except in the following features. Size considerably larger, form much more robust. Ovipositor valves as normal for the genus, with distal teeth of dorsal pair not narrowing as much as is usual in allied genera, and with apex in consequence horizontally more broadly convex (in the present series the valves average proportionately slightly shorter than in the other species). Prosternal spine very heavy, heavier than in male, distinctly widest transversely. Interspace between mesosternal lobes quadrate.⁹

		<i>Measurements (in millimeters)</i>				
	♂	Length of body	Length of pronotum	Width of pronotum	Length of caudal femur	Width of caudal femur
<i>Type.</i>		10.8	2.7	2.4	6.9	2.2
<i>Paratypes</i> ¹⁰ (24).		10-12.8	2.6-3.2	2.4-3	6.7-8.7	2.1-2.8
	♀					
<i>Allotype.</i>		15.5	3.7	3.9	9.8	2.8
<i>Paratypes</i> (8).		15.2-17.8	3.2-3.8	3.4-4.1	9-10.2	2.7-3

Coloration of male very similar to that of *mimica*, except that the buffy markings margining the dorsum of the pronotum laterad are decidedly narrower than is normal in that species, in a few specimens being obsolete. The males are brown, with pale markings buffy and darker markings dark brown. Minor differences in intensity of color pattern are frequent and occasional recessive specimens have the buffy portions yellowish with a very weak tinge of green.

The females agree with the males in general type of color pattern, which is, however, usually much less strongly defined, the markings margining the dorsum of the pronotum laterad being reduced and confined to the prozona or entirely wanting, and the dorsal surface of the caudal femora shows the two dark transverse bands much less distinctly. Two color phases occur in this sex, one in which the general coloration is brown (warm sepia to mikado brown), the other with head, dorsal portions of thorax and caudal femora olive (yellowish olive to light yellowish olive) and abdomen brown. In all the species of *Paraidemona* the caudal tibiae are glaucous tinged with green (lumiere blue to turquoise green).

⁹ This feature is not as valuable to separate females of this species from those of *mimica* (in which this interspace averages much longer than wide) as might be imagined. Individually a decided amount of variation occurs, which has convinced us that, though useful as a secondary diagnostic feature, this character has by no means the value we often find ascribed to it in the literature. In the series of *P. mimica* at hand the interspace between the mesosternal lobes varies from subquadrate to nearly three times as long as wide. We have found similar variation in this feature in species of *Melanoplus*.

¹⁰ The average of the series is nearest the type, the maximum individual is decidedly larger than any of the others.

Specimens Examined: 40; 26 males, 11 females, 1 immature male and 2 immature females.

TEXAS: Laguna del Gato in Hidalgo County, Brownsville and Piper Plantation in Cameron County.

In addition to the type and allotype, a series of twenty-four males and eight females bearing the same data are considered paratypes. The material was all taken, with the exception of three pairs, by Rehn and Hebard between July 31 and August 6, 1912. The others were taken at Brownsville April 30, 1895 (a pair in coitu) and May 23, 1913.

The insects were found common about Brownsville, in company with *P. mimica* Scudder, wherever grassy areas occurred, either in the open or in open spaces in the river plain jungle scrub. At the Piper Plantation, *mimica* was found to be much the more abundant species in such situations. The present insect probably enjoys a much wider distribution south of the Rio Grande than in the United States.

Paraldeмона fratercula¹¹ new species (Plate VIII, fig. 12.)

1897. *Paraldeмона punctata* Scudder (not *Pezotettix punctatus* Stål, 1878), Proc. U. S. Nat. Mus., XX, p. 42. (In part.) [♀, Corpus Christi Bay, Texas.]

This insect is closely related to *P. mimica* Scudder, differing only in the average smaller size, slightly more robust form and in the male furcula and supra-anal plate.

The distribution of this species does not reach as far east, north or west in the United States as that of *mimica*. We would note that, from the material at hand, *mimica* is generally distributed over the entire known range of *fratercula*, everywhere averaging decidedly larger except in the Brownsville region of Texas, where a marked reduction in size is shown by the majority of specimens taken. As a result, we would have been unable to separate females of these species from that region without the large series now available.

Type.—♂; Lyford, Cameron County, Texas. August 6 and 7, 1912. (Rehn and Hebard.) [Hebard Collection, Type No. 477.]

¹¹ In allusion to the fact that this species is a diminutive form, showing close relationship to *P. mimica* Scudder.

Agrees fully with a paratype of *mimica* before us except in the following features. Size small, (averaging) decidedly smaller than *mimica*, but appreciably larger than *P. latifurcula*, here described. Form moderately robust.¹² Interspace between mesosternal lobes subquadrate.¹³ Furcula represented by twin, slightly swollen adjacent processes, which project beyond the margin of the segment less than (rarely in the series varying to fully) half the basal width of one of these. Supra-anal plate with lateral margins feebly convergent and rather strongly convex in proximal two-thirds and elevated, plate there decidedly (rarely in the series weakly) constricted, the distal third consequently small, triangular with lateral margins convergent and feebly convex to the acute apex, bearing in this portion a medio-longitudinal sulcus. Cerci simple, slender, acute conical, about two-thirds as long as supra-anal plate. Caudal margin of pronotum, pallium, subgenital plate and prosternal spine as in *mimica*.

Allotype.—♀; same data as type. [Hebard Collection.]

Similar in every way to females of *mimica* except for the (average) decidedly smaller size and (average) slightly more robust form, which causes the caudal femora to be shorter and slightly heavier. Prosternal spine moderately heavy with apex rather sharply rounded (in the series the apex is seen to vary somewhat in form and when more nearly acute is often slightly flexed cephalad). Interspace between the mesosternal lobes slightly longer than broad (varying in the series to distinctly longer than broad).

<i>Measurements (in millimeters)</i>					
♂	Length of body	Length of pronotum	Width of pronotum	Length of caudal femur	Width of caudal femur
<i>Type</i> .	12	2.8	2.7	7.7	2.4
<i>Paratypes</i> (18).	10.7–13.8	2.7–3.2	2.4–2.9	7.3–8.3	2.2–2.6
♀					
<i>Allotype</i> .	17.1	3.7	3.9	10	2.8
<i>Paratypes</i> (28).	15.6–19	3.3–3.9	3.6–4.1	9.2–10.4	2.8–3

The variation shown by the Lyford series is not exceeded in any of the additional material at hand.

Coloration.—No noteworthy differences from *mimica* are apparent in coloration. As in that species, two color forms, green and brown, occur; in the present series in about equal numbers, while in the Laredo series a condition about intermediate, pale yellowish with a green tinge, is found. The intensification and recession of the color pattern is shown by the series to be considerable. Nearly all the brown females and a number of the green phase have the color pattern fully as marked as in the male sex, in this feature apparently differing from the usual condition found in *latifurcula*.

¹² When the series at hand are placed beside each other, those of the present species appear slightly more robust than those of *mimica* and slightly less robust than those of *latifurcula*. The difference is, however, not sufficient to be of any value for individual comparisons.

¹³ This feature varies in the present species. See page 150, footnote 9.

Specimens Examined: 112; 49 males, 61 females and 2 immature males.

TEXAS: Beeville, Corpus Christi, Katherine, Lyford, Laguna del Gato in Hidalgo County, Piper Plantation in Cameron County, Lake Lomalta in Cameron County, Point Isabel, Benavides, Carrizo Springs, Cotulla and Laredo.

A series of eighteen males and twenty-eight females from Lyford, bearing the same data as the type, are here designated as paratypes. All but eight specimens of *fratercula* were taken by Rehn and Hebard, between July 28 and August 14, 1912. Two females at hand, from Corpus Christi Bay, were taken in December.

The species was found generally distributed in grassy areas, where at Lyford it was present in very large numbers. Its distribution in the United States is seen to be much wider than that of *latifurcula*, but by no means as extensive as that of *mimica*. The fourth species of the genus, *punctata* (Stål), shows the highest specialization of the male genitalia and is known to us only from Dallas, Texas.¹⁴

Eotettix davis¹⁵ new species (Plate VIII, fig. 13.)

The two species of this genus here described differ widely from the three previously known species, in their brown general coloration and male cerci, which are in each differently specialized, not simple and acute conical. Their general coloration never shows greenish yellow or green in the adult and, though somewhat shining, has in life none of the pearly and distinctive luster which in the field so strikingly distinguishes the other species.

Both *davis* and *quercicola*, here described, agree closely in general; the characters for separating them are given under the latter species. In general appearance these insects suggest rather strongly a very large and exceedingly smooth development of the Scudderi Group of the genus *Melanoplus*. The general structure, however, satisfies us that they must be assigned to *Eotettix*.

Type.—♂; De Funiak Springs, Walton County, Florida. August 30, 1915. (Rehn and Hebard.) [Hebard Collection, Type No. 478.]

¹⁴ Described from "Texas." Seudder has, in his revision, misidentified as *punctata* females of *mimica* from Goliad and Carrizo Springs and of *fratercula* from Corpus Christi Bay.

¹⁵ In honor of our good friend Mr. William T. Davis, of Staten Island, New York, whose careful collecting trips in Florida and publications have helped greatly in the proper understanding of the Orthoptera of that state.

Size large for the genus (averaging about as large as the maximum found in *E. signatus* Seudder); form medium, as in *signatus*. Surface well supplied with rather long microscopic hairs, as in *signatus*. Interocular space narrow, distinctly narrower than in *signatus*, *palustris* or *pusillus*. Fastigium moderately produced and shallowly concave mesad, not deeply so as in those species; frontal costa with lateral margins moderately pronounced, not as sharply carinate. Eye slightly longer than cheek. Antennae elongate, over twice as long as the elongate pronotum. Pronotum with medio-longitudinal carina moderately decided, cut only by principal sulcus, not as decided as in *signatus*, *palustris* or *pusillus*; caudal margin of pronotum very broadly obtuse-angulate produced. Tegmina very slightly overlapping, broadly oval, showing some truncation distad particularly in the distal marginal portion of the lateral field, as long as prozona and half the metazona; humeral angle distinct, the dorsal field being feebly but appreciably defined from the lateral field. Distal portion of abdomen not enlarged. Furcula consisting of two, nearly attingent, slight convexities, from each of which project beyond the segment a minute rounded projection, the length of which approximates its width. Supra-anal plate moderately broad shield-shaped; lateral margins subsinuuous, weakly convex to the rounded apex; surface rather decidedly concave laterad in proximal two-thirds, mesad raised, strongly sulcate in proximal third with lateral margins of this sulcation strongly carinate. Cercus a broad plate, slightly less than twice as long as its basal width, surface deplanate; margins feebly convergent to the rather broad, rounded apex, dorsal margin weakly concave, ventral margin weakly convex. Subgenital plate small, convex, tapering to the rather large and produced rounded apex, which is situated mesad on the dorsal free margin (in this respect differing from *signatus*, *palustris* and *pusillus*, in which the subgenital plate bears a distinctly subapical tubercle). Prosternal spine stout, moderately elongate, blunt. Interspace between mesosternal lobes considerably over twice as long as its least width. Caudal femora medium, slightly heavier than in *signatus*. Caudal tibiae with twelve spines (on each margin).

Allotype.—♀; same data as type. [Hebard Collection.]

Agrees with male except in the following features. Size much larger, form much more robust. Eye no longer than cheek. Tegmina with dorsal field more distinctly defined from lateral field. Ovipositor valves moderately elongate, not strongly curved distad to their acute apices. Prosternal spine heavier than in male. Interspace between mesosternal lobes about one and one-half times as long as least width.

Measurements (in millimeters)

	♂	Length of body	Length of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur
<i>Type</i> .		21	5	4.3	3	12.1
<i>Paratypes</i> (87).		18.5-22	4.8-5.2	4.1-5.1	2.8-3.1	11.7-12.9
	♀					
<i>Allotype</i> .		26.2	6.8	5.1	3.8	15.8
<i>Paratypes</i> (30).		25-27.2	6.3-7	4.2-5.7	3.2-3.9	14.8-15.7

Considerable variation is shown by the size and length compared with breadth of the tegmina in this series, but in all the specimens these organs are distinctive from those of *quercicola*, as discussed under that species.

Coloration.—Male. Face varying from russet to yellowish. Eyes dark brown. Antennae ferruginous. Occiput, disk of prozona and entire metazona and dorsal field of tegmina sayal brown, individually varying to warm sepia. Lateral fields of tegmina slightly darker than dorsal field of the same. Head showing a broad postocular band of black, which is much broader on the pronotum, continued to the principal sulcus and occupying nearly the entire dorsal half of the lateral lobes; remaining portions of lateral lobes cephalad of principal sulcus clay color, rarely with a very weak olivaceous tinge. Abdomen clay color, other portions of ventral surface yellowish. Cephalic and median femora clay color, often with an olivaceous tinge (in some specimens isabella color). Caudal femora with external face sayal brown, individually varying to warm sepia, with a broad pregenicular yellowish annulus; ventral surface yellowish with a greenish tinge; dorsal surface buffy with two broad transverse bands of dark brown, which bands are very frequently individually citrine; genicular areas very dark, blackish brown except the distal portions of the genicular lobes which are paler. Caudal tibiae coral red, spines black.

Female (recessive). General coloration of dorsal surfaces ochraceous-tawny, paling to ochraceous-buff laterad and on the occiput. Head showing a narrow postocular black band, continued as a very narrow line along the dorsal margins of the lateral lobes of the pronotum to the principal sulcus. Eyes hazel. Tegmina appreciably bicolored, dorsal field ochraceous-tawny, lateral fields ochraceous-tawny washed with cinnamon-brown. Underparts yellowish. Caudal femora unicolorous, the genicular areas alone showing traces of black. Caudal tibiae coral red; spines black, except at bases which are pink. In the maximum intensive coloration females are almost as dark as males, the postocular bar very broad on the prozona, spreading over nearly half of the surface of the lateral lobes, with ventral margin frequently irregular and sometimes with a spot of the pale ground coloration showing through mesad, this bar continued more narrowly on the metazona to the caudal margin. Tegmina with dorsal field cinnamon-brown, lateral fields prouts brown. Caudal femora showing the bands of the dorsal surface, but not as pronounced as in the male.

The series at hand shows that in the immature instars two distinct color phases occur, at least in females; in one the general coloration is yellowish green¹⁶ (14), in the other brown (18), the postocular dark bars in all variably well defined, except in a few of the yellowish green individuals.

Specimens Examined: 158; 93 males, 32 females, 1 immature male and 32 immature females.

FLORIDA: De Funiak Springs and Pensacola.

A series of eighty-nine males and thirty-one females from De Funiak Springs, bearing the same data as the type, are here designated as paratypes. All of the material of this species was taken by Rehn and Hebard between August 28 and 30, 1915.

¹⁶ Light green with a yellowish tinge in life.

The species was found very rare in gallberry bushes, *Ilex glabra*, in low sandy long-leaf pine woods, *Pinus palustris*, at Pensacola. At De Funiak Springs in sandy long-leaf pine woods, with undergrowth of wire-grass and much oak shoots and dwarf oak, the insect was found in large numbers, locally wherever this type of country occurred, the oak undergrowth evidently being the food plant as was also found to be true for the allied *quercicola*. The species is truly thamnophilous, not rapid in its movements, but jumping with great power. When approached, individuals often hid on the underside of the oak leaves and when seized by a cautious approach and sudden grasp were found to cling tenaciously to their support.

Eotettix quercicola new species (Plate VIII, fig. 14.)

This species agrees closely with *E. davisi*, here described, in both general appearance, habits and actions. The present insect supplants *davisi* in Florida east of De Funiak Springs.

This species is readily distinguished from *davisi* in the male sex by the very different cerci and appreciably broader apex of the subgenital plate, and in both sexes by the tegmina, which show no distal truncation and have their surfaces even, showing no definition between the dorsal and lateral fields. The males of this species also average distinctly less attenuate, while the females show the postocular dark bars in their maximum intensification narrower than is normal in *davisi*, with coloration of the same solid and ventral margins not irregular.

Type.—♂; Woodville, Leon County, Florida. September 1, 1915. (Rehn and Hebard.) [Hebard Collection, Type No. 479.]

Agrees in all respects with the type of *davisi*, except in the following features. Size moderately large (average somewhat smaller than in *davisi*); form medium, not as attenuate as in that species. Pronotum with medio-longitudinal carina not fully as decided as in *davisi*. Tegmina slightly overlapping, oval, the curvature of the margin greatest distad, surface showing no definition between dorsal and lateral fields. Supra-anal plate as in *davisi* except that a transverse carina runs for a brief distance laterad from the extremities of the carinae, bounding the proximal median sulcus. Cercus slightly over twice as long as proximal width, dorsal margin very feebly concave to apex, ventral margin feebly convex and converging toward dorsal margin in proximal three-quarters, the remaining narrow distal fourth of the cercus curved inward, with margins parallel to the rounded apex, this portion about one-third as wide as the basal width. Subgenital plate as in *davisi* except that it is somewhat more produced,

with apex decidedly broader, over twice as wide as deep and feebly bilobate. Interspace between mesosternal lobes in length distinctly less than twice its least width. Caudal tibiae with (eleven and twelve) spines.

Allotype.—♀; same data as type. [Hebard Collection.]

Agrees with male except in the following features. Size much larger, form much more robust. Eyes slightly shorter than cheek. (Tegmina similar, this feature serving best to separate females of this species from *darisi*.) Ovipositor valves moderately elongate, not strongly curved distad to acute apices. Interspace between mesosternal lobes scarcely longer than broad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur
<i>Type</i> .	19.7	4.7	4.2	2.3	11.7
<i>Paratypes</i> (28).	17.2-21	4.7-5	4-4.8	2.7-2.8	11.3-11.9
Carrabelle, Florida.	16.3	4.1	3.9	2.6	10.5
Ocala, Florida.	20.8	5.2	4.7	3	12.3
♀					
<i>Allotype</i> .	27.7	6.8	5.8	3.7	15.1
<i>Paratypes</i> (34).	24.3-28.2	6-7	5-6.8	3.6-4	14.2-15.6
Carrabelle, Florida.	23.2	5.8	5.1	3.6	13.5
Ocala, Florida.	30.5	7.2	5.9	4.2	16.5

The size average is decidedly less for the Carrabelle material than for the series from Woodville, decidedly greater than that series for the Ocala specimens. Material from additional localities will be needed to determine whether the difference is attributable to geographic distribution or merely to different local environmental conditions.

The coloration is almost identical with that of *darisi*, the only noteworthy feature being the postocular dark bands in the female. This band averages narrower and is rarely continued beyond the principal sulus in the females from Woodville and Carrabelle. In the eight females from Ocala it is decidedly broader, but shows no irregularities of its ventral margin or mesal pale marking, as it does when developed to this degree in *darisi*.

The three immature females at hand from Woodville are solidly greenish yellow, with face and disk of pronotum weakly suffused in two, but showing no trace of postocular bars. These are from the series showing greater recessive coloration and immatures from Ocala would probably show the same features found in *darisi*.

Specimens Examined: 84; 36 males, 45 females and 3 immature females.

FLORIDA: Woodville, Carrabelle and Ocala.

A series of twenty eight males and thirty four females from Woodville, bearing the same data as the type, are designated paratypes. The entire series was taken between September 1 and 19, 1915 and 1917, by Rehn and Hebard.

The species was found common in sandy long-leaf pine, *Pinus palustris*, flatwoods among dwarf oaks and oak shoots at Woodville; very few in scrub oaks and oak shoots on flat sandy soil at Carrabelle, and few in oak clumps at from two to five feet from ground at Ocala, in an environment very similar to that of Woodville. The species, like *davisi*, is thamnophilous, not rapid in movements, but extremely powerful in leaping and unusually able in hiding in the oak undergrowth to which it is peculiar.

HESPEROTETTIX Scudder

The species of this genus are extremely difficult to define properly. The male genitalia, of such great diagnostic importance in so many species of the Melanopli, show no differences of value between many of the species. Moreover, features of coloration afford important factors in separating certain species, though in some a decided amount of color variation occurs. Virtually all the color variation within a species is attributable to intensification and recession of the color pattern, but it is clear that, with this in mind, great care must be exercised in attributing specific diagnostic values to features of coloration. Furthermore it is apparent that great reduction in the organs of flight constitute a valid reason for separating more than one species from a long-winged species showing very slight additional differences, though in other genera of the Melanopli (*Melanoplus*, *Dendrotettix*) species occur in which both these conditions are found, in some being ascribable to nothing more than individual variation.

We admit that the features used below are in some cases not as satisfactory as could be desired, but their sum total shows an insect widely different in general appearance from its nearest allies. We are confident that future studies in the chromosomes and internal anatomy of these species will prove them far more distinctive than might be supposed.

Hesperotettix gemmicula new species (Plate VIII, fig. 15.)

This, the smallest of the Eastern species of the genus, is in our opinion the handsomest of the known forms.

Nearest relationship is with *H. osceola*, here described, under which species a comparison is made. These species belong to the

Pratensis Group, of which *osceola* is the only member having greatly reduced tegmina and wings.

Compared with *H. brevipennis* (Thomas) the present insect is seen to average smaller and more slender, the medio-longitudinal pronotal band is paler, usually paler mesad than laterad, the dark marking of the lateral lobes of the pronotum is very broadly bordered by white ventrad, the tegmina reach to the apex of the abdomen or slightly beyond and are green except for a longitudinal humeral band, the caudal femora show faintly two transverse bars on their dorsal surfaces and do not have their external faces washed with pink.

Type.—♂; Carrabelle, Franklin County, Florida. September 2 to 3, 1915. (Rehn and Hebard.) [Hebard Collection, Type No. 481.]

Size small for the genus, form slender. Eyes very slightly more prominent and showing a less decided difference between length and width than in *brevipennis*. Medio-longitudinal dorsal band of pronotum not solidly pink, the median portion distinctly paler than the margins. Dark bar of prozonal portion of lateral lobes solid in coloration, the ventral border of this bar white and about equally broad (in a few specimens of the series narrower, this feature then showing no difference from *brevipennis*). Tegmina and wings fully developed, as in *H. pratensis* Seudder, extending nearly to apices of caudal femora (in the males at hand varying slightly, minimum extending to apex of abdomen, maximum to apices of caudal femora). Tegmina distinctively colored; dorsal and lateral fields green except for a broad longitudinal humeral band of pink (the dorsal portion of this band in the lateral field usually darkened). Genitalia of the same general type as found in *pratensis* and *brevipennis*;¹⁷ cerci alone differing in being narrow and of subequal width in distal half, moderately incurved in this portion, with apex sharply rounded. Prosternal spine shorter and stouter than in *brevipennis*, tapering more rapidly in distal portion to the sharply rounded apex. Antennae and broad annuli of cephalic and median femora similar to *brevipennis*, except that they are not as brilliantly colored. Caudal femora green, the pregenicular pinkish annulus distinct (but individually variable, and obsolete in a few specimens at hand); dorsal surface pale green with two weak but distinct broad transverse bands of darker green¹⁸ and showing no trace of pink along the external margin as is characteristic of *brevipennis*; external surface green (never washed with pink as in *brevipennis*); dorsal half of lateral portions of genicular areas black as in *brevipennis*.

¹⁷ In the present genus slight individual variation in the form of the subapical tubercle of the male subgenital plate occurs.

¹⁸ These bands are exceedingly delicate and in poorly dried material might easily be obscured. No trace of such marking ever occurs in *brevipennis*.

Allotype.—♀; same data as male. [Hebard Collection.]

Agrees with type except in the following features. Size larger, form slightly more robust (averaging decidedly smaller and more slender than in females of *brevipennis*). Diagnostic features of coloration as given for male, except that the medio-longitudinal dorsal stripe of the pronotum is proportionately narrower (normally for the series, but in a few specimens proportionately fully as wide as in the male and unicolorous, not paler mesad than laterad), and longitudinal humeral band of the tegmina proportionately much narrower, so that more of the surface of the insect is green. Ovipositor valves normal for the genus.

Measurements (in millimeters)

	♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Length of caudal femur
<i>Type</i> .		15.2	3.9	2	10.8	9.5
<i>Paratypes</i> (4).		14.5–15.3	3.7–4	1.9–2	9.7–11.5	9.2–10.2
Pensacola, Florida						
(4).		14.5–15.5	3.6–4.1	1.9–2.2	11.7–13	8.8–10.4
	♀					
<i>Allotype</i> .		17.9	4.8	2.7	11.9	11.7
<i>Paratypes</i> (6).		16.8–20.8	4.1–4.8	2.3–2.7	11.4–12.8	10.2–12
Pensacola, Florida						
(7).		18.2–23.3	4.8–5.7	2.7–3.1	14.6–15.5	11.2–12.8

The Pensacola series shows no difference from that from Carrabelle, except in the slightly but distinctly longer tegmina and wings and in a greater size variation between the extremes. This species occurs in very dry environment and at Pensacola was taken at two widely separated situations, the optimum examples coming from the less extreme of these. The Carrabelle examples were all taken over an area showing the extreme condition of dryness and much more exposed to storms than at the points about Pensacola where the insect was collected. It would appear from the evidence that local environmental conditions explain all the size variation which occurs, while it is probable that the slight reduction in tegminal length is a response to the more exposed and wind-swept character of the coast at Carrabelle.

Head cougce green, usually with a very small black marking extending ventrad from the lower margin of the eye. Eyes metallic cinnamon brown. Antennae vinaceous-rufous. Pronotum cougce green; with a medio-longitudinal band, which is flesh color with lateral margins heavily but narrowly suffused with cameo brown; lateral lobes with a broad blackish band, slightly ascendent cephalad, which extends caudad to the principal sulcus and is

bordered ventrad by a band of white of about equal width. Other lateral portions of thorax course green; the meso-episternum ventrad with a blotch of vinaceous-russet, deepening in color mesad; the meta-episternum occupied by a broad oblique white marking, margined above and below with black. Tegmina course green with a broad longitudinal humeral band of congo pink, this much suffused with cameo brown toward the dorsal margin of the lateral field. Abdomen dull green yellow, the dorsal segments margined laterad with white. Cephalic and median limbs course green, their femora almost completely occupied by very broad bands of salmon-orange to orange-rufous. Caudal femora (usually) showing a broad pregenicular annulus of orange-rufous; dorsal surface course green with two broad transverse bars of slightly darker shade; external face light lillibore green paling to course green proximad with ventral margin of same color as ventral surface, bright chalcodony yellow; dorsal half of lateral portions of genicular areas black. Caudal tibiae lumiere blue. The variation in the series of the more important features of coloration is given with the original description.

Specimens Examined: 23; 9 males and 14 females.

FLORIDA: Big Bayou near Pensacola, Pensacola and Carrabelle.

A series of four males and six females, in addition to the type and allotype, bearing the same data, are designated paratypes. The entire series was taken between August 28 and September 2, 1915 by Rehn and Hebard.

The species is peculiar to very sandy areas; at Big Bayou it was found occasional in a bushy low sand-loving plant, at Pensacola very scarce among the undergrowth of scant grasses and sand-loving plants in forest of long-leaf and small sand pines. At Carrabelle very few were taken through the low bushes of the sand dune areas, which are covered heavily with arenicolous shrubs and bushes and some scrubby pine and oaks. Only with particular effort was it possible to secure the series. Heavy beating was found to be the most productive method.

Hesperotettix osceola¹⁹ new species (Plate VIII, fig. 16.)

This species is closely related to *H. gemmicula*, here described, but is readily separated by the very abbreviate tegmina which in length average near that of the pronotum. Additional features of difference are: the normally narrower dark marking of the lateral lobes of the pronotum, with white marginal marking ventrad usually not reduced and the unicolorous dorsal surfaces of the caudal femora.

¹⁹ War chief of the Seminole Indians in Florida.

The similarity in general type of color pattern, particularly that of the tegmina, shows the affinity of these species and distinguishes them from the other species of the *Pratensis* Group.

Type.—♂; Ocala, Marion County, Florida. September 19, 1917. (Rehn.) [Hebard Collection, Type No. 482.]

Agrees with the type of *gemmicula* except in the following features. Size (averaging in series) larger; form slender, slightly more robust than in *gemmicula*. Dark bar of prozonal portion of lateral lobes of pronotum narrow and solid in coloration, the ventral border of this bar white (as broad in the type, twice as broad or slightly more than twice as broad as the bar in the other specimens). Tegmina greatly reduced, appreciably shorter than pronotum (varying in series to very slightly longer than pronotum), slightly overlapping; form broad ovate, the dorsal field being distinctly defined from the lateral field. Tegmina distinctively colored, as in *gemmicula*; dorsal and lateral fields green except for a rather broad longitudinal humeral band of pink, the dorsal portion of this band in the lateral field darkened. Genitalia as in *gemmicula*, except that the cerci in the narrow distal portion have their margins feebly convex.²⁰ Caudal femora green, the pregenicular pinkish annulus broad and distinct, no transverse bands occur on dorsal surface as in *gemmicula*, or pink suffusion on external face and external margin of dorsal surface as in *H. brevipennis* (Thomas).

Allotype.—♀; taken in coitu with type. [Hebard Collection.]

Agrees with type except in the following features. Size much larger, form more robust. Diagnostic features of coloration as given for the male, except that the medio-longitudinal dorsal stripe of the pronotum is decidedly broader, pale, with very dark margins and is continued on the abdomen to near its apex. Ovipositor valves normal for the genus.

Measurements (in millimeters)

	♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur
<i>Type</i> .		18.5	4.7	2.4	4	2.3	11.7
<i>Paratype</i> .		16.1	4.2	2.2	3.8	2.3	11.7
	♀						
<i>Allotype</i> .		24.5	5.7	3.3	4.7	3.1	14.3
<i>Paratype</i> .		24.2	5.7	3.3	5.8	3.5	15
De Leon Springs, Florida.		21.4	5.1	3.1	4.8	2.9	13.2

The coloration and color pattern of this insect shows no important differences from that of *gemmicula*. It is possible that this insect may eventually prove to be a geographic race of that

²⁰ In this genus, showing so little differentiation in the simple type of cerci, we believe that frequent slight individual variation will be found to occur and that such difference as here given may prove to be of very little diagnostic value.

species, but we have no evidence of this as yet. We suggest this since a very similar condition in *H. gillettei* is clearly only of geographic racial value in that case, as treated below.

Specimens Examined: 6; 2 males and 4 females.

FLORIDA: Ocala and De Leon Springs.

A male bearing the same data as the type and a female taken the following day by Hebard are designated paratypes. The series was taken between September 8 and 20, 1917 by Rehn and Hebard. The species was exceedingly scarce, very long search on four days having been made to secure the six examples. It was evident that the date was very late for this species, as three of the specimens when taken had each lost one of the caudal limbs.

Like *gemmicula* the species was found peculiar to very sandy areas. At De Leon Springs one individual was beaten from a dwarf oak in a wide sand scrub area, the other from dwarf oaks, bay cedar and other bushes more than a mile distant in the sand scrub. At Ocala the four specimens were secured in sandy flat-woods by beating the undergrowth, which was composed of a leguminous plant and bunch grass.

Hesperotettix nevadensis termius²¹ new geographic race (Plate VIII, fig. 17.)

This geographic race is based on a condition showing greatly reduced tegmina and wings, developed over an apparently restricted area of the species' distribution. Comparable with this is *Melanoplus occidentalis brevipennis* Bruner.²² In both these species such a condition is constant over a certain area, elsewhere in their distribution never being found²³; in the present species intermediates from the regions of intergradation with *nevadensis gillettei* are at hand.²⁴ It is possible that *H. osceola*, may prove to

²¹ From *τέρμος* = last; as showing the highest specialization in this species.

²² Described as *flabellifer brevipennis*. We find *Melanoplus flabellifer* Scudder to be an absolute synonym of *Melanoplus occidentalis* (Thomas).

²³ We would note that in the normally short-winged *Melanoplus scudderi* (Uhler) a long-winged condition is found, though very rarely. In that species the structure of the tegmina shows that such a condition is wholly attributable to individual reversion to the primitive type, and should in no way receive nominal recognition.

²⁴ Without the large series at hand it would be impossible to determine the correct value of the features shown by the present material.

be a similar race of *H. gemmicula*, both species here described, but we have no evidence as to this, and it is clear that *H. floridensis* Morse is similarly derived from a common stock with *H. speciosus* (Scudder), though still further specialized and no question of its specific validity now being possible.

The present species is a member of the Viridis Group, and *H. gillettei* Bruner represents another geographic race widely distributed over the central Rocky Mountain region.

We have discussed this question as to values of tegminal differentiation here, to show how absolutely essential it is to judge each case separately. Dogmatic treatment is utterly impossible.

Type.—♂; Milford, Beaver County, Utah. Elevation 4900 feet. September 5, 1909. (Rehn and Hebard.) [Hebard Collection, Type No. 483.]

Agrees fully with the type of *nevadensis gillettei* except in the following characters. Size (averaging in series) smaller. Tegmina greatly reduced, slightly shorter than pronotum, slightly overlapping, somewhat truncate distad; tegminal form broad ovate, the dorsal field being distinctly defined from the lateral field.

The type is yellowish brown in general coloration, the color pattern is discussed below.

Allotype.—♀; same data as type. [Hebard Collection.]

This specimen agrees fully with the type except in the following features. Size larger. Tegmina broadly quadrato-ovate, due to the somewhat greater distal truncation; separated from each other by a brief interspace.

The allotype is brilliantly colored, with color pattern intensive as discussed below. General coloration dull green-yellow (a bright color).

Measurements (in millimeters)

	♂	Length of body	Length of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur
<i>Type</i> .		13.5	3.2	3.1	1.8	8.4
<i>Paratype</i> .		13.8	3.6	3.1	1.8	8.2
Caliente, Nevada						
(4).		12.9-13	3.1-3.2	3.8-3	1.5-1.7	7.7-7.6

Measurements (in millimeters)—continued

♀	Length of body	Length of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur
<i>Allotype.</i>	19.7	4.3	3.7	2.2	9.7
<i>Paratypes</i> (5).	17.1-20.4	3.9-4.5	3.1-4.5	2-2.5	9.4-10
Crestline, Nevada					
(1).	19	4.1	3.3	2.1	9.8
Caliente, Nevada					
(2).	19.5	4.2-4.3	5.4-5.9	2.3	10.1-10.2

The Caliente series is atypical in having the tegmina lanceolate rather than truncate distad, these organs in the females being distinctly more elongate. This is clearly a slight divergence toward the condition of the typical race.

Several specimens of *nevadensis gillettei* from Tintic, Utah, on the other hand, show divergence toward the present race in having the tegmina reduced, decidedly variable in the series, proving that locality to be in the area of intergradation.²⁵

Coloration.—A brilliant green and a yellowish brown phase of coloration are found in *nevadensis terminus*. In the most vividly green individuals the color pattern shows its maximum intensification. The head has two postocular and one subocular whitish line on each side, the more dorsal of the postocular bars margining the eyes in the occipital region, which region also has a pale medio-longitudinal suffusion. The pale medio-longitudinal band of the pronotum is conspicuous, dark margined, and so continued to near the abdominal apex. The pronotal lateral lobes have a pale band above and below the dark marking. The tegmina are green, dark along the costal margin, with a weakly defined pale line above this and another near the sutural margin. The caudal femora have the pregenicular pink annulus decided, the dorsal surface pale and (normally) with two slightly darker transverse bands weakly defined,²⁶ the external face rather dark green with a narrow pale ventral border of the same greenish yellow as the ventral surface.

In the remaining specimens this type of coloration is found, but the markings are variously less striking and blurred. Comparison with series of *nevadensis gillettei* shows the coloration of that race to be very similar, specimens nearly identical with each individual here examined being obtainable. In that race, however, the large majority are of a rich brown color phase with color pattern intensive, and nearly all have the dorsal marginal band of the lateral lobes of the pronotum broader and extending over the lateral portions of the pronotal disk.

²⁵ One specimen has fully caudate tegmina, a condition not shown in any other example of the considerable series of *nevadensis* before us.

²⁶ In *nevadensis nevadensis* these bands are normally strongly defined, in *nevadensis gillettei* they are normally obsolete.

Specimens Examined: 15; 6 males and 9 females.

UTAH: Milford.

NEVADA: Crestline and Caliente in Lincoln County (material from the latter locality somewhat atypical).

A series from Milford, of one male taken September 18, 1908, by J. C. Bradley and five females bearing the same data as the type and allotype, are designated paratypes. All but the specimen referred to above were taken by Rehn and Hebard between September 3 and 5, 1909.

The species was found very scarce in weedy areas of valley bottoms at Milford and Caliente, particularly in a yellow-flowered, feathery, green plant of the daisy family, growing solidly waist-high over large areas. Every effort was made to secure a good representation, the material being obtained by long and continuous beating. Earlier in the season the insect is probably more numerous.

ARGIACRIS²⁷ new genus

This monotypic genus is placed after *Asemoplus* and before *Bradynotes* in linear arrangement. In general appearance closest resemblance is found to *Bradynotes*, but from that genus it is readily separated by the pronotum which has the disk distinct from the lateral lobes, but showing no acute marginal earina on each side and the caudal margin obtuse-angulate produced, by the presence of very broadly lanceolate tegmina, and, in the female, by the fully exposed ovipositor valves. In this last feature it agrees rather with *Asemoplus*. Though the produced caudal margin of the pronotum distinguishes this genus from the genera following *Melanoplus*, viz.—*Dendrotettix*, *Podisma*, *Asemoplus* and *Bradynotes*, the general character of its robust structure, broad vertex, small eyes and general character of male genitalia show that it belongs with these genera and not with *Melanoplus* and allied genera.

Genotype.—*Argiacris rehni* new species.

Generic Characters.—Form very stout. Head as in *Bradynotes*. Interocular space wide; vertex blunt; eyes small, very much shorter than cheeks. Pronotum with disk rounding rather broadly into lateral lobes, caudal margin obtuse-angulate produced. Abbreviate but broad tegmina present. Male genitalia

²⁷ From ἀργίος = slow and ἀκρίς = grasshopper.

of general type found in *Bradynotes*, small furcula present as in two of the species of that genus. Female ovipositor valves fully exposed.

Argiacris rehni²⁸ new species (Plate VIII, fig. 18.)

This distinctive insect is obscurely colored, except for the brilliant pink of the internal faces of the caudal femora ventrad and of the caudal tibiae.

Type.—♂; Livingston, Park County, Montana. Elevation, 5000 feet. July 29, 1909. (Rehn and Hebard.) [Hebard Collection, Type No. 480.]

Size large, form very robust. Head with interocular space half as wide as length of one of the eyes; eye small, moderately protuberant, three-quarters as long as cheek. Pronotum with disk moderately convex; medio-longitudinal carina weakly defined only on metazona; transverse sulci not deep; caudal margin broadly obtuse-angulate produced with apex broadly rounded. Tegmina very broadly lanceolate, considerably shorter than pronotum, sutural margins attinent proximad (in the series varying from slightly overlapping to separated by a brief interval), apices acute and sharply rounded. Furcula represented by two minute rectangulate projections with angles rounded, separated by a space slightly wider than one of these projections. Supra-anal plate simple, triangularly shield-shaped, lateral margins convergent and feebly convex to the rather acute apex; surface concave each side of the medio-longitudinal sulcus, which is bounded by rather decided lateral carinae to near the apex of the plate. Cereus simple, about two and one-half times as long as basal width, tapering decidedly in proximal half, distal half showing a moderate flexure dorsad, widening very feebly then very slightly and gradually narrowing to the broad, rounded apex. Subgenital plate of the general type usual in *Bradynotes*, but with an acute-conical projection meso-dorsad on the free margin. Prosternal spine short, heavy, acute-conical. Interspace between mesosternal lobes distinctly longer than least (proximal) width. Limbs robust.

Allotype.—♀; same data as type. [Hebard Collection.]

Similar to male except in the following features. Size larger, form more robust. Interocular space with width about two-thirds length of eye. Eye about three-fifths as long as cheek. Tegmina separated by a brief interval (width of this interval individually moderately variable). Ovipositor valves fully exposed. Prosternal spine very short and heavy, with apex acute and sharply rounded. Interspace between mesosternal lobes with length contained about one and one-third times in least width.

²⁸ In honor of our friend and fellow-worker, Mr. James A. G. Rehn, for whom both personally and scientifically we have the highest regard.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of disk of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur
Type.	22.3	5.5	3.4	4.9	3.3	11.9
Paratypes						
(6).	16.9-21.8	5.2-5.4	3.3-3.4	4.8-5.3	3.1-3.3	11.2-11.8
♀						
Allotype.	27.4	6.3	4.6	5.4	4	12.3
Paratypes						
(2).	28.7-29.4	6.3-6.2	4.7-4.8	6-5.8	3.8-3.9	12.1-12.2

General coloration snuff brown; paler on face, there buffy, darker on occiput and dorsum of pronotum, there tinged with sepia. Eyes verona brown. Antennae mikado brown. Underparts clay color. Caudal femora with two broad transverse blackish bands on dorsal surface, the first continued on the external face and running obliquely proximad half way across, the more distal crossing the external face vertically, there broader but more obscure. Caudal tibiae and ventral face of femora brilliant jasper red.

Little color variation is shown by the series, in the paler examples the general color is slightly lighter and the transverse dark bands of the dorsal surfaces of the caudal femora are not continued on the external faces.

In addition to the type and allotype, a series of six males and two females, bearing the same data, are designated paratypes.

This series was captured on the ridge of a slope of a bare hog-back showing numerous cherty exposures. The ground there showed rather scant vegetation with tufts of a peculiar woolly plant all about. Careful and intensive collecting was necessary to secure the ten specimens, apparently members of a single colony, taken over a very restricted area.

EXPLANATION OF PLATE VIII

- Fig. 1.—*Gymnoscirtetes pusillus* Scudder. Supra-anal plate of male (*type*) Jacksonville, Florida. ($\times 21$)
- Fig. 2.—*Gymnoscirtetes pusillus* Scudder. Outline of cercus of male (*type*) Jacksonville, Florida. ($\times 32$)
- Fig. 3.—*Gymnoscirtetes pusillus* Scudder. Caudal view of subgenital plate of male (*type*). Jacksonville, Florida. ($\times 21$)
- Fig. 4.—*Gymnoscirtetes morsei* new species. Supra-anal plate of male (*type*). ($\times 21$)
- Fig. 5.—*Gymnoscirtetes morsei* new species. Outline of cercus of male (*type*). ($\times 32$)
- Fig. 6.—*Gymnoscirtetes morsei* new species. Caudal view of subgenital plate of male (*type*). ($\times 21$)
- Fig. 7.—*Phaulotettix eurycercus* new species. Cercus of male (*type*). ($\times 25$)
- Fig. 8.—*Phaulotettix eurycercus* new species. Caudal view of subgenital plate of male (*type*). ($\times 12$)
- Fig. 9.—*Phaulotettix compressus* Scudder. Outline of cercus of male. Uvalde, Texas. ($\times 25$)
- Fig. 10.—*Chloroplus cactocactes* new genus and species. Cercus of male (*type*). ($\times 22$)
- Fig. 11.—*Paraideмона latifurcula* new species. Dorsal view of supra-anal plate and preceding segment of male (*type*). ($\times 15$)
- Fig. 12.—*Paraideмона fratercula* new species. Dorsal view of supra-anal plate and preceding segment of male (*type*). ($\times 15$)
- Fig. 13.—*Eotettix darvsi* new species. Outline of cercus of male (*type*). ($\times 25$)
- Fig. 14.—*Eotettix quercicola* new species. Outline of cercus of male (*type*). ($\times 25$)
- Fig. 15.—*Hesperotettix gemmicula* new species. Dorsal view of caudal femur of male (*type*). ($\times 3$)
- Fig. 16.—*Hesperotettix osceola* new species. Dorsal view of tegmen, seen from directly above, in normal position. *Paratype*. ($\times 6$)
- Fig. 17.—*Hesperotettix nevadensis terminus* new race. Dorsal view of tegmen, seen from directly above, in normal position. *Paratype*. ($\times 6$)
- Fig. 18.—*Argiacris rehni* new genus and species. Dorsal view of male (*type*). ($\times 2\frac{1}{2}$)